of plants, has adopted the admirable plan of giving under each species a brief note of its range, a most valuable addition in a paper of which the importance is chiefly distributional. The plates consist of photo-etchings well executed in the Survey of India Office, and represent fishes, reptiles and crustaceans, the rock structure of a biotite granite, and a view of an *Ovis poli* skin on a wall of rough stones amongst small orchards. The last is so good a plate, that it is impossible to help regretting that a more congenial background has not been selected.

W. T. B.

SOCIOLOGICAL SCIENCE.

Outlines of Sociology. By Lester F. Ward. Pp. xii + 301. (New York: The Macmillan Company, 1898.)

MR. WARD'S little volume, with its clear thought and trenchant writing on more than one topic of current interest, will be welcomed by all students of sociology. It is a reprint of twelve chapters formerly contributed by the author to the *American Journal of Sociology* during the years 1895 to 1897. In the first six lectures, which bear the general title "Social Philosophy," Mr. Ward discusses the old question of the proper position of sociology in a systematic classification of the sciences. The general philosophical position adopted is that of Comte, but the author very properly restores anthropology and psychology to their lawful position in the scheme of the sciences between biology and sociology, and insists with great force upon the very special dependence of sociological on psychological science. The most interesting feature of this part of the book is Mr. Ward's able criticism of Mr. Herbert Spencer's favourite comparison of society to a huge biological organism. Following the lead of Prof. Huxley, he shows, by irresistible arguments, that it is not the whole biological organism, but only the nervous system which really corresponds to a society, and further, that society in its present state is at best a "very low form of organism."

> "The most extreme socialist would shrink from the contemplation of any such absolutism as that exercised by the central ganglion of even the lowest of the recognised Metazoa. In order to find a stage comparable to that occupied by society with respect to the central control of the functions of life, it is necessary to go down among the Protozoa and study those peculiar groups of creatures that live in colonies so adapted, that, while the individuals are free to act as they please within certain limits, they are still imperfectly bound together by protoplasmic threads to such an extent that they are in a measure subordinate to the mass thus combined, and really act as a unit or body."

When conscious co-operation of society, as a whole, for its own welfare supersedes sporadic individual effort, and not before will there be a real parallelism between social institutions and the nervous structure of the higher animals.

In the second part of the book, which is entitled "Social Science," Mr. Ward describes the gradual evolution of such a higher form of social structure. Social institutions at first grow up unconsciously under the pressure of the mere "struggle for existence." As intelligence progresses this stage of mere "genesis" passes into the higher stage, called by Mr. Ward "telesis"; unconscious growth gives place to the deliberate manufacture of institutions by conscious purposive action. Hitherto such conscious creation of social institutions has been the work of a few exceptional individuals, but in a higher stage of evolution we may expect it to take the form of "collective telesis," *i.e.* the deliberate co-operation of the community as an organised whole in the work of social amelioration.

Perhaps the most valuable part of Mr. Ward's book is that in which he discusses the differences between mere unconscious growth and deliberate constructive activity. It has been too much the fashion of sociologists in recent years to argue directly from biological analogies, forgetting that society is at least as much a machine as an organism, and that the presence in all but the lowest stages of social evolution of deliberate human purpose profoundly modifies the whole character of the evolutionary process. As Mr. Ward pithily phrases it, "the environment transforms the animal, but man transforms his environment," a remark which has an obvious bearing upon the application of evolutionary principles to the problems of ethics. Altogether the student who is not content with being told that society "evolves," but wishes to know how specifically social differs from merely biological evolution, will find Mr. Ward's last six chapters singularly luminous and suggestive. The get-up and typography of the book are generally worthy of commendation, but there are some ugly misprints of classical names.

A. E. TAYLOR.

OUR BOOK SHELF.

A Text-book of Botany. By Dr. E. Strasburger, Dr. Fritz Noll, Dr. H. Schenck, Dr. A. F. W. Schimper; translated from the German by H. C. Porter, Ph.D. With 594 illustrations, in part coloured. (London: Macmillan and Co., Ltd., 1898.)

THE "Text-book of Botany" issued from the famous institute at Bonn has met with such favour on the part of teachers and students, that it is a matter of surprise that the translation of it into English should have been so long deferred. However it is certain to be extensively used, as the subject is handled from a comprehensive standpoint, and the authors have succeeded in hitting the happy mean between a too elementary and a too advanced treatment.

It is the more to be regretted that, as it was passing through the press, the emendations and corrections which have some time ago appeared in the third German edition were not incorporated in the present volume, which seems based on the first edition in the original language. It is, for example, surprising, and to a student confusing, to find elaborate figures and descriptions of centrospheres in dicotyledonous cells on p. 61, when it is known that the author of this part of the book (Strasburger) has long ago abandoned his belief in their existence, and in the current German text expressly denies their presence in these plants. It may also be doubted whether the book gains at all in value by the somewhat poor coloured illustrations of certain examples of flowering plants, although in this the publishers are but following the original. If, however, they could see their way to reduce the rather high price of the book at the expense of these really useless luxuries, both its own circulation and the temper of the purchaser would improve. For it is not a little remarkable to find a work which in Germany can be bought for 7 marks, costing in its English dress 18s. The book is intrinsically so good that it is to be hoped

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that a more moderate price will place it within the means of many students who at present will certainly be debarred from possessing it, save through the intermediation of the second hand bookseller.

Automobiles sur Rails. By G. Dumont. Pp. 184. (Paris: Gauthier-Villars et Fils. Masson et Cie.)

Régularisation du Mouvement dans les Machines. By L. Lecornu. Pp. 217. (Paris: Gauthier-Villars et Fils. Masson et Cie.)

THESE two volumes belong to the Encyclopédie scientifique des Aide-Mémoire, and, like most of the volumes in this series, they contain concise statements of the subjects with which they deal. M. Dumont examines the various systems of horseless traction in use. He begins with steam motors, and then in successive short chapters describes compressed air motors, gas and oil motors, motors driven by carbon dioxide and by ammonia, cable traction, and electric motors. The descriptions are not detailed enough to be entirely satisfactory, nevertheless the volume contains a useful survey of the condition and methods of automobile traction.

M. Lecornu gives in his volume a detailed discussion of the motions of governors of indirect and direct action. His treatment of the various problems involved, and his theorems on the conditions of equilibrium of different governors will interest students of the mathematics and mechanics of machinery.

A Pocket Dictionary of Hygiene. By C. T. Kingzett, F.I.C., and D. Homfray, B.Sc. Pp. 104. (London: Baillière, Tindall, and Cox, 1898.)

THIS pocket-book is intended to be of assistance to medical and sanitary officers in their work, by providing them with concise information upon subjects comprehended in the theory and practice of hygiene. The amount of information given is somewhat unequal, and we should hardly have thought it necessary to include such definitions as: "Adipose, fatty. Anhydrous, without water. Cardiac, pertaining to the heart. Caustic, any substance which destroys animal tissue. Combustion, the process of burning. Emanate, to issue or flow from. Morbid, diseased or unwholesome," &c. Hertz's name is spelt Herz, and Lenard is printed Lennard, in the description of Röntgen rays.

The Secret of the Poles. By Henry Campion. Pp. 48. (Birmingham: White and Pike, Ltd., 1898.)

AMONG the views advanced by the author in this booklet are the following:—The earth is hollow—there is a hollow region large enough to hide the moon and to spare—the earth's axis is hollow—it has two openings, one at each pole—meteoric swarms and ether are attracted through the axis at the south polar entrance, there producing the aurora australis, and after acting as fuel for the fire in the interior is shot out as a waste product at the north polar exit, where it produces the aurora borealis. The character of the book is sufficiently indicated by these extracts, which need no comment.

Wireless Telegraphy, popularly explained. By Richard Kerr, F.G.S. Pp. xv + 111. (London: Seeley and Co., Ltd., 1898.)

MR. W. H. PREECE expresses his general approval of this little volume in a short preface; but at the same time he mentions that he does not accept any responsibility for the controversial points raised. The author explains the principles and practice of telegraphy without intervening wires in words which will be found intelligible by readers unfamiliar with electrical terms. His descriptions possess the merit of being popular in style, and the illustrations assist in brightening the text.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. *No notice is taken of anonymous communications.]*

Chance or Vitalism.

PROF. JAPP'S exceedingly interesting address on "Stereochemistry and Vitalism" contains a direct challenge to those who, like myself, hold that we can at present only remain agnostic with regard to the problem of "the possibility or impossibility of living matter originating from dead matter by a purely mechanical process." Unfortunately the facts upon which he bases his view, that chemical compounds of one-sided asymmetry cannot arise save under the influence of life, touch a field so much more familiar to him than to me, that it may seem presumption on my part to make one or two suggestions drawn more directly from my own sphere of work. Still, to the philosophical side of his reasoning I think Clifford, whom he challenges, might, perhaps, have been ready with some reply. I would first state what, I think, stripped of technical language, and represented by the simplest case, is Prof. Japp's standpoint:

(1) Optically active liquids are due to asymmetrical molecules.

(2) These asymmetrical molecules arise from the replacement in a symmetrical molecule of either a right-hand or left-hand atom out of two equal atoms which are images of each other.

(3) No optically active substance can be formed unless there be a selection of purely right-handed or purely left-handed atoms, or, at any rate, unless there be a sensible majority of one or of the other.

(4) Some asymmetric solvents have a power of selective action on optically inactive mixtures of right-handed and left-handed atoms, or, to use the technical term, of two enantiomorphs.

(5) No mechanical process (chemical or physical) could select a right-handed as distinguished from a left-handed atom in a symmetrical molecule, and so produce an asymmetric compound. Any mechanical force which acts on a symmetrical molecule is as likely to affect one atom in a molecule as its image. If I. be the selecting of a right-hand atom and II. of a left-hand atom, then, as Prof. Japp puts it:

"The chances in favour of these two events being equal, the ratio,

$$\frac{\text{Number of occurrences of event I.}}{\text{Number of occurrences of event II.}}$$

will, if we are dealing with an infinitely great number of molecules, approximate to unity. We therefore obtain a mixture, optically inactive by inter-molecular compensation."

Now, putting on one side any objections to Prof. Japp's reasoning arising from the fact that it is based on a purely geometrical hypothesis as to the constitution of molecules, which is also merely descriptive, for we can have no ultimate evidence of its actuality[1]—I would draw attention to the fact that (5) is an appeal to the doctrine of chance, and that Prof. Japp tells us that the *mechanical* production of a left-handed or right-handed enantiomorph is an event like the tossing of a coin, of which the chances are precisely equal as to heads or tails. Now if Prof. Japp will toss twenty coins, ten heads and ten tails will undoubtedly be the most frequent result; but there will be a variation about this mean result, and if he goes on tossing long enough he will ultimately come to an instance of twenty heads or twenty tails alone. Cases in which there is a preponderance of heads or tails of a very sensible kind will not be very infrequent. I take it that it is only a *majority* of left- or right-handed enantiomorphs which is required to produce an optically active substance. What majority might be easily ascertained by delicate experiments on the rotatory power of mixtures of dextro- and laevo-acids which are mirror-images of each other. Now, according to Prof. Japp, chance is the factor at work in the production of optically inactive mixtures of right- and left-handed enantiomorphs. Hence, it may be in the course of indefinite ages, purely mechanical action must certainly have produced chemical compounds of one-sided asymmetry with various degrees of rotatory power, due to the greater or less

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[1] Such a *geometrical* hypothesis cannot give the *dynamical* explanation of rotatory polarisation required by the physicist, and therefore the "eminent physicist" quoted by Prof. Japp was, I venture to think, right in saying that an explanation of rotatory polarisation is still wanting.

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